

Listing of Claims:

Claim 1 (currently amended): An evaporation-induced self-assembly method to prepare a liquid, crystalline film mesophase material, comprising:

mixing a precursor sol, a solvent, a surfactant, and an interstitial compound to prepare a ~~silica~~ sol, wherein said surfactant is at a concentration less than the critical micelle concentration; and

evaporating a portion of the solvent from said ~~silica~~ sol to form a liquid, crystalline, film mesophase material.

2. (original) The method of claim 1 further comprising the step of heating said liquid, crystalline, film mesophase material to form a surfactant-templated film.

3. (original) The method of claim 2 wherein the step of heating removes a portion of said surfactant.

4. (original) The method of claim 3 wherein the surfactant-templated film has pores of diameter of approximately less than 200 Å.

5. (original) The method of claim 3 wherein the surfactant-templated film has a surface area greater than approximately 100 cm² /cm² film surface.

6. (original) The method of claim 1 wherein the interstitial compound is physically entrapped within said liquid, crystalline, thin film mesophase material.

7. (Currently amended) The method of claim 1 wherein the precursor sol is selected from the group consisting of ~~tetraethylorthosilicate~~ tetramethylorthosilicate, tetraethylorthosilicate, titanium butoxide, titanium iso-propoxide, zirconium n-butoxide,

~~aluminum iso-propoxide~~, and aluminum iso-propoxide.

8. (original) The method of claim 1 wherein the interstitial compound is selected from the group consisting of organoalkoxysilanes, proteins, dyes, and metal-containing compounds.

9. (original) The method of claim 8 wherein the interstitial compound is selected from the group consisting of tridecafluoro-1,1,2,2,-tetrahydrooctyltriethoxysilane, mercaptopropyltrimethoxysilane, rhodamine B, cytochrome c, and 3-(2,4-dinitrophenylamino)propyl(triethoxy)silane.

10. (original) The method of claim 2 wherein the surfactant-templated film is an ordered material with at least two x-ray diffraction peaks in the range $2\theta = 0.5-10^\circ$.

11. (original) The method of claim 2 wherein the surfactant-templated film is a disordered material with one x-ray diffraction peak in the range $2\theta = 0.5-7^\circ$.

12. (original) The method of claim 2 wherein the surfactant-templated film is exposed to ammonia vapor to promote condensation.

13. (original) The method of claim 1 wherein the surfactant is selected from the group consisting of sulfates, sulfonates, phosphates, carboxylic acids, alkylammonium salts, gemini surfactants, cetyldimethylammonium salts, dialkyldimethylammonium, primary amines, poly(oxyethylene) oxides, octaethylene glycol monodecyl ether, octaethylene glycol monohexadecyl ether and block copolymers.

14. (original) The method of claim 1 wherein the solvent is selected from the group consisting of an alcohol, formamide, and tetrahydrofuran.

15. (original) The method of claim 1 wherein the step of evaporating a portion of the solvent is performed by a method selected from the group consisting of spin-coating, spray-coating, dip-coating, and aerosol processing.

16. (original) The method of claim 15 wherein the silica sol is coated onto a substrate by a method selected from the group consisting of spin-coating, spray-coating, and dip-coating.

17. (original) The method of claim 16 wherein said substrate is selected from the group consisting of a crystal silicon wafer and a piezoelectric crystalline quartz substrate.

18. (original) The method of claim 1 wherein the interstitial compound is selected from the group consisting of a hydrophobic molecule, an oligomer, and a polymer.

19. (original) An evaporation-induced self-assembly method to prepare a porous, surfactant-templated film, comprising:

mixing tetraethylorthosilicate, alcohol, water, an acid, a surfactant, and tridecafluoro-1,1,2,2-tetrahydrooctyltriethoxysilane, wherein said surfactant is at a concentration less than the critical micelle concentration, to form a homogeneous mixture;

coating a substrate with said homogeneous mixture, said coating inducing evaporation of a portion of the solvent to produce a liquid, crystalline film mesophase material; and

heating said liquid, crystalline film mesophase material to decompose said surfactant, forming a porous, surfactant-templated film.

20. (original) The method of claim 19 wherein the surfactant is cetyltrimethylammonium bromide.

21. (original) The method of claim 20 wherein the molar ratios of tridecafluoro-1,1,2,2-tetrahydrooctyltriethoxysilane: tetraethylorthosilicate:alcohol:water: cetyltrimethylammonium bromide are 0.15:0.85:21.8:5.1:0.0053.